The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

Paper No. 30

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

*Ex parte* HITOSHI SUMIYA and SHINYA UESAKA



Appeal No. 2003-1525
Application 09/462,876

ON BRIEF

Before OWENS, KRATZ, and TIMM, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

*DECISION ON APPEAL*

This appeal is from the fourth (non-final) rejection of claims 1 and 4-10, which are all of the claims remaining in the application.[1]

[1] In an appeal in which claims have been at least twice rejected, the board has jurisdiction as discussed in *Ex parte Lemoine*, 46 USPQ2d 1432 (Bd. Pat. App. & Int. 1995).

*THE INVENTION*

The appellants claim a cutting tool comprising a specified cubic boron nitride sintered compact, and a process for making the compact. Claims 1 and 9 are illustrative:

1. A cutting tool comprising, as an edge part, a cubic boron nitride sintered compact containing cubic boron nitride having an average grain diameter of at most 1 $\mu$m, in which the cubic boron nitride sintered compact has, at the said edge part, an $I_{(200)}$, $/I_{(111)}$ of (220) diffraction intensity ($I_{(200)}$ to (111) diffraction intensity $I_{(111)}$ ratio of at least 0.05 in X-ray diffraction of arbitrary direction and impurities are substantially not contained in the grain boundaries, wherein the traverse rupture strength of the said cubic boron nitride sintered compact is at least 80 kgf/mm$^2$ by a three point bending measurement at a temperature between 20°C and 1000°C and the thermal conductivity of the cubic boron nitride sintered compact, at the said edge part, is 250 to 1000 W/m·K.

9. A process for the production of a sintered compact for a cutting tool containing cubic boron nitride with an average grain diameter of at most 1 $\mu$m, which comprises reducing and nitriding boron oxide or boric acid in the presence of carbon and nitrogen to synthesize a low pressure phase boron nitride and subjecting the resulting low pressure phase boron nitride, as a starting material, to direct conversion into cubic boron nitride at a high temperature and high pressure, while simultaneously sintering.

*THE REFERENCES*

| | | |
|---|---|---|
| Suzuki et al. (Suzuki) | 5,691,260 | Nov. 25, 1997 |
| Kawasaki et al. (Kawasaki) | 6,096,671 | Aug. 1, 2000 |
| | (effective filing date | Jan. 15, 1997) |
| Mitsubishi Materials Corp. (JP '068)[2] (Japanese patent application) | 9/59068 | Mar. 4, 1997 |

[2] Citations herein to JP '068 are to the English translation thereof which is of record.

*THE REJECTIONS*

The claims stand rejected as follows: claims 1 and 4-8 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103 as obvious over Suzuki or JP '068, and claims 9 and 10 under 35 U.S.C. § 103 as obvious over Kawasaki in view of Suzuki.

*OPINION*

We reverse the rejections of claims 1 and 4-8 and affirm the rejection of claims 9 and 10.

*Rejections of claims 1 and 4-8*

We need to address only claim 1, which is the sole independent claim among claims 1 and 4-8.

The examiner argues that Suzuki discloses a cubic boron nitride (cBN) sintered body (col. 1, lines 9-10) which is formed by a direct conversion method (col. 2, line 44) at a temperature of 1900-2100°C and a pressure of at least 6.5 GPa (col. 4, lines 64-67) for preferably at most 120 minutes (col. 5, lines 1-2), has an average primary crystal grain size of preferably at most 1.0 μm (col. 4, lines 4-7), and is useful for cutting cast iron (col. 5, lines 22-24) (answer, page 4).

The examiner argues that JP '068 discloses a cubic boron nitride sintered compact having a 0.1-1 μm grain size which is formed by sintering pure hexagonal boron nitride (hBN) at 2000°C and 7 GPa for 30 minutes (items 0010 and 0011) (answer, page 4).

The examiner acknowledges that Suzuki and JP '068 fail to disclose the cBN sintered compact properties, other than average grain diameter, recited in the appellants' claim 1 (answer, page 4). Nevertheless, the examiner argues that the cBN sintered compacts of Suzuki and JP '068 are substantially identical to that recited in the appellants' claim 1 and that, because the Patent and Trademark Office does not have facilities for testing products, the burden has shifted to the appellants to show a patentable difference between their recited cBN sintered compact and those of Suzuki and JP '068 (answer, pages 4-5). The examiner argues that this is a rationale "tending to show" that the claimed product appears to be the same as or similar to that of the prior art (answer, page 5).

When a claim is in product-by-process form the patentability of the claimed invention is determined based on the product itself, not on the method of making it. *See In re Thorpe*, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985) ("If the product in a product-by-process claim is the same as or obvious

from a product of the prior art, the claim is unpatentable even though the prior art product was made by a different process."). Whether a rejection is under 35 U.S.C. § 102 or § 103, when the appellants' product and that of the prior art appear to be identical or substantially identical, the burden shifts to the appellants to provide evidence that the prior art product does not necessarily or inherently possess the relied-upon characteristics of the appellants' claimed product. *See In re Fitzgerald*, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980); *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977); *In re Fessmann*, 489 F.2d 742, 745, 180 USPQ 324, 326 (CCPA 1974). The reason is that the Patent and Trademark Office is not able to manufacture and compare products. *See Best*, 562 F.2d at 1255, 195 USPQ at 434; *In re Brown*, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972).

As indicated above, the examiner's burden is not merely to provide a rationale "tending to show" that the claimed product and that of the prior art are identical or substantially identical. The burden is to provide evidence which is sufficient to show that the claimed and prior art products actually do appear to be identical or substantially identical.

The examiner has pointed out that the cBN grain sizes and the direct conversion temperatures, pressures and times of Suzuki and JP '068 are within the appellants' ranges (specification, page 11 and examples). The appellants, however, have provided evidence (Rule 132 declaration of Hitoshi Sumiya, filed September 23, 2002) that carrying out the direct conversion such that these factors are the same as those of the appellants does not necessarily result in a sintered cBN compact being produced which has properties within all of the ranges recited in the appellants' claim 1.

Moreover, the appellants teach that to obtain their cBN sintered compact "[i]t is required that the low crystallinity BN or fine grain, normal pressure type BN used herein is prepared by reducing boron oxide or boric acid with carbon, followed by nitriding" (specification, page 10). Suzuki and JP '068 do not disclose making the starting BN in this manner but, rather, disclose starting with, respectively, pyrolytic boron nitride (pBN) and hBN (Suzuki, col. 4, lines 23-25; JP '068, items 0010 and 0011). The examiner has not provided evidence or reasoning which shows that, even though Suzuki and JP '068 do not use the starting BN which the appellants state is required to

make their cBN sintered compact, it reasonably appears that the cBN sintered compacts of Suzuki and JP '068 are the same or substantially the same as that of the appellants.

The examiner, therefore, has not carried the burden of establishing a *prima facie* case of anticipation of the appellants' claimed cutting tool by either Suzuki or JP '068.

Although the examiner rejects claims 1 and 4-8 also under 35 U.S.C. § 103 over Suzuki or JP '068, the examiner does not provide any reason why these references would have fairly suggested, to one of ordinary skill in the art, a cBN sintered compact having the properties recited in the appellants' claim 1.

For the above reasons we reverse the rejections of claims 1 and 4-8 under 35 U.S.C. §§ 102(b) and 103 over Suzuki or JP '068.

*Rejection of claims 9 and 10*

Suzuki discloses a process for producing a cutting tool sintered compact containing cBN having an average primary crystal grain size of preferably at most 1.0 μm, comprising direct conversion of a low pressure phase boron nitride into cBN while simultaneously sintering (col. 1, lines 9-10; col. 2, lines 44-46; col. 4, lines 4-7 and 64-67).

Suzuki does not disclose obtaining the low pressure phase boron nitride by reducing and nitriding boron oxide or boric acid in the presence of carbon and nitrogen. However, Suzuki indicates that the low pressure phase boron nitride can be hBN, provided that it is highly pure so that it produces the desired high purity sintered cBN (col. 2, lines 44-57; col. 3, lines 11-12; col. 4, lines 23-26). Thus, Suzuki would have fairly suggested, to one of ordinary skill in the art, use of any hBN which is known to be sufficiently pure to produce a high purity sintered body. One such hBN is that of Kawasaki which, Kawasaki teaches, can be used to form high purity sintered hBN (col. 3, lines 17-19). Kawasaki's hBN is made by mixing boric acid and melamine in an atmosphere containing steam, and crystallizing the resulting melamine borate particles to produce hBN. Melamine is a compound used by the appellants to provide the carbon and nitrogen used in reducing and nitriding boric acid (example 1).

The appellants argue that "Suzuki et al. employ pBN to obtain a cBN sintered compact which is highly oriented in the (111) structure and, hence, exhibits anisotropic properties in strength and direction, with very low strength" (brief, page 12). Suzuki mentions measuring (111) diffraction intensity when determining the amount of low pressure phase boron nitride

remaining as an impurity in the cBN (col. 3, lines 22-35; col. 6, lines 14-28), but does not appear to provide the teaching referred to by the appellants. Suzuki teaches, to the contrary, that the cBN has high strength (col. 2, line 14; col. 5, line 39).

The appellants argue that the starting materials of Suzuki and Kawasaki have higher crystallinity than the appellants' starting material and that, therefore, the appellants' claimed process is different than that of Suzuki or Kawasaki (brief, pages 13-14). This argument is not relevant to the issue of whether the applied references would have fairly suggested, to one of ordinary skill in the art, the process as claimed, which is not limited to any particular crystallinity.

The appellants argue that "Suzuki et al. disclose a process for producing cBN by direct conversion; however, Suzuki et al. employ pyrolytic BN as a starting material" (brief, page 13). Actually, Suzuki does not limit the starting material to pBN but, rather, teaches that "as the starting material, it is required to employ a low pressure phase boron nitride having a high purity, such as pyrolytic boron nitride" (col. 4, lines 23-25).

The appellants argue that "it is inconceivable that one having ordinary skill in the art would have **stopped** the methodology of Kawasaki et al., surgically extract the hBN particles disclosed by Kawasaki et al. as suitable to [sic] for sintering, and then employ them in methodology disclosed by Suzuki et al." (reply brief, page 6). Suzuki teaches that the hBN particles can be used not only for sintering, but also for making a resin and/or rubber composite (col. 9, lines 21-28; col. 10, lines 62-62). Thus, use of Kawasaki's hBN particles as Suzuki's starting material does not require stopping Kawasaki's sintering process and performing the surgical extraction argued by the appellants.

As for dependent claim 10, Suzuki discloses a direct conversion and sintering temperature of 1900-2100°C and pressure of at least 6.5 GPa (col. 4, lines 64-67), both of which are within the ranges recited in claim 10.

Accordingly, we affirm the rejection of claims 9 and 10 under 35 U.S.C. § 103 over the combined teachings of Kawasaki and Suzuki.

*DECISION*

The rejections of claims 1 and 4-8 under 35 U.S.C. §§ 102(b) and 103 over Suzuki or JP '068 are reversed. The rejection of claims 9 and 10 under 35 U.S.C. § 103 over Kawasaki in view of Suzuki is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

*AFFIRMED-IN-PART*

TERRY J. OWENS )
Administrative Patent Judge )
)
)
PETER F. KRATZ )
Administrative Patent Judge ) BOARD OF PATENT
) APPEALS AND
) INTERFERENCES
CATHERINE TIMM )
Administrative Patent Judge )

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McDermott Will & Emery
600 13th Street, N.W.
Washington, DC 20005-3096